8-1-2018

Failure-to-Rescue Simulations as a Risk Management Strategy for Registered Nurses

Trena K. Seago
Bellarmine University, iwhs@icloud.com

Failure-to-Rescue Simulations as a Risk Management Strategy for Registered Nurses

Trena Seago

Bellarmine University

DNP Project

Failure-to-Rescue Simulations: A Risk Management Strategy for Registered Nurses

The United States ranks last in patient safety compared to other industrialized countries (Miller, 2013). The totality of safety errors was largely unknown until they were described in a 1991 Institute of Medicine (IOM) report (Dumitrescu & Ryan, 2014; Hoppes & Mitchell, 2014). The types of errors included diagnostic, treatment, preventative, and equipment or system errors. All scopes of practice are vulnerable to these types of errors. Most nurses have faced one or more of these medical errors either directly or indirectly at some point in their careers. Because of this potential for errors and its impact on patient safety, it is essential that evidence-based strategies are identified and implemented to protect nurses and the patients for whom they care.

A discussion is currently underway on the efficacy of simulations that promote patient safety (Sollid et al., 2016). Simulation is not new to the healthcare environment and is a staple in nursing education. Risk management efforts that enhance healthcare competencies in point-of-care settings take on a variety of forms, one of which is patient simulation. This study will explore patient simulation as a strategy to improve the self-efficacy of new nurses caring for patients in a deteriorating patient scenario. In the hospital setting, the Registered Nurse (RN) plays a key role in identifying signs of a deteriorating patient as early as possible in order to improve patient outcomes.

Background and Significance

Simulation, which has a long history of use in nursing education, provides students with a safe environment for learning (Leighton, 2013; Rosen, 2013; Wheeler, Williams, & Merry, 2009). In the healthcare setting, simulation has helped hospital staff become better prepared for emergencies, both in following protocols and communicating as a team during crises (Reece, Cooke, Polivka, & Clark, 2016; Rutherford-Hemming & Alfes, 2017).

The Joint Commission's (2017) summary report of sentinel event data revealed at least 297 events involving the wrong patient, the wrong procedure, or the wrong site over a three-year period from 2014 to 2016. A sentinel event is defined as a patient who suffers death or severe injury unrelated to their original diagnosis (*Joint Commission*, 2017). Furthermore, Kohn, Corrigan, and Donaldson (2000) found that "preventable adverse events were the leading cause of death in US hospitals" (p. 26). Morbidity, in terms of sentinel events, could be viewed as the complications or conditions that may develop because of an adverse event. For example, if a patient receives the wrong blood type, then the patient will have a greater threat to mortality. If a patient is prescribed the wrong medication the patient could potentially have an adverse complication, such as acute kidney failure, which is a threat to morbidity. Sentinel events can have a staggering impact on a person's life and the hospital's finances. In 2012 the estimated cost of medical errors was nearly $37.6 billion, with $17 billion being preventable errors (Andel, Davidow, Hollander, & Moreno, 2012).

Over the years, vast changes in healthcare delivery and protocols have been made to help prevent medical errors. Simulated or mock codes, for example, are methods for improving the performance of RNs and other healthcare professionals who must often respond to code situations (Reece et al., 2016). Patient simulation may also involve the training of healthcare professionals in complex situations, which may prevent future sentinel events (Leigh, 2011). The use of patient simulation offers two modes of learning: 1) experiential learning through simulation and 2) reflection through debriefing (Aggarwal & Darzi, 2011; Ruddy & Patterson, 2008). Debriefing refers to the time following the simulation when participants come together in a safe environment to reflect on their experience (Phrampus & O'Donnell, 2013). The debriefing, which is done immediately after the scenario is completed, helps aid in any learning that can be transferred to real practice by reflecting on what actions or interactions were done well and what could have been done better. This combination of technology, training, and awareness form the trifecta of tools that can decrease patients' risk of experiencing sentinel events and is critical for the future of healthcare.

Purpose

The purpose of this Doctor of Nursing Practice Scholarly Project is to investigate the use of patient simulation among RNs as an anticipatory education method for reducing the risk of failure-to-rescue situations.

Literature Review

Safety, and the ability to report issues without fear of reprimand, are crucial to the practice of nursing. One role of risk management is to assess hospital safety reports and to determine whether a root-cause analysis (RCA) is required. Risk management emerged in the 1970s and '80s as a department within healthcare systems that deals with adverse event reporting and addresses the rising costs of medical liability insurance (Carroll, 2015). Since then, RNs have frequently held healthcare roles within their institutions, although the proactive management of identified risks is a goal shared by all healthcare workers (Carroll, 2015; Vincent, 2001).

The 1999 IOM report "To Err Is Human" stated that sentinel events are a reality in the healthcare system. Part of the risk manager's role is to determine if a threat to safety is present or if a serious safety event has occurred (Carroll, 2015; Paneasar, Carson-Stevens, Salvilla, & Sheikh, 2014; Vincent, 2001). Once examined, near misses or serious safety events serve as opportunities for learning.

Through experiential and reflective learning environments, RNs and other health professionals can acquire best practices for preventing sentinel events using patient simulation (Aebersold, 2011). Errors are bound to occur when humans are involved, so focusing on risk reduction through drills or simulations can be an effective preventive measure or intervention tool for ensuring patient safety (Kim, 2016; Kusler-Jensen, 2014). To provide some perspective, Dumitrescu and Ryan (2014) interviewed a group of 38 pediatric healthcare professionals, physicians, and RNs to discuss medical errors the participants had made in the past. Of the participants, 35 responded that they had incurred some level of medical error that had led to patient disability (14%) or fatality (17%); 63% of the participants reported that the error had not resulted in harm, but 92% indicated that the experience had affected their practice.

The prevailing purpose for simulation in the healthcare setting, is to foster learning and safe practices without incurring any patient risk. The following review examines the literature on the use of simulation for educating healthcare professionals about actual and potential safety events.

Simulation

When discussing simulation, it is important to understand that simulations have different levels (low, medium, and high) of fidelity, a term used to describe the level of realism (Seago, 2016). Before digital technology became available, static manikins were used to simulate the patient’s body, and low-fidelity task trainers were used to replicate various body parts. Both methods were used to train healthcare professionals on the implementation of a medical procedure, such as giving intramuscular injections or obtaining intravenous access (Leighton, 2013; Rosen, 2013; Seago, 2016). The two instruments were eventually merged; the static, full-body manikins were given orifices (such as nose) for inserting a nasal gastric tube and reservoirs for mock body fluids. Advances in technology eventually replaced the static manikin; features were equipped with computer components, which offered medium fidelity (Seago, 2016).

Today, high-fidelity patient simulators are more sophisticated and interactive than previous simulators. High-fidelity manikins can replicate heart, lung, and bowel sounds; mimic seizure activity; dilate pupils; maintain palpable pulses and blood pressure; display cardiac rhythms and oxygen saturation; and allow for real-time communication with caregivers (through an imbedded microphone) using pre-recorded patient responses that are activated on demand as the scenario warrants (Aebersold, 2011; Bonjour, Charny, & Thaxton, 2016; Hallenbeck, 2012).

Simulation continues to be of interest worldwide. Rutherford-Hemming and Alfes's (2017) systematic review identified a total of 65 studies conducted between 2012 and 2015 in various countries, 45 of which focused on simulation-based education in US hospital settings. The authors found a growing trend of using simulations to orient new graduate nurses and to help them transition to the hospital bedside environment. They also identified two translational studies that examined the effects of simulation use on patient care outcomes; these two studies revealed that the use of simulation in orientation promotes positive patient outcomes. Rutherford-Hemming and Alfes (2017) concluded their review by suggesting that larger sample sizes, more randomized controlled trials, and more reliable and valid instruments would be needed to gain more insights.

Due to the ever-changing landscapes of medical and nursing care, learning is a life-long commitment for healthcare professionals. Simulation methods are carving out a permanent place in point-of-care settings. The main goal for simulation, in both pre-licensure and professional settings, is to promote safe practices throughout the healthcare system without incurring any additional patient risks.

Simulation in Healthcare

Simulation offers a safe environment for experiential learning, including learning patient safety concepts (Leigh, 2011; Seago, 2016). One such concept is the reduction of trauma resuscitation times (TRT), or the time that it takes for health care providers to recognize and respond to trauma situations. Multiple studies have demonstrated that simulation reduces TRTs by increasing skill acquisition, as it promotes teamwork of the healthcare providers, including nurses (Heard, Fredette, Atmajuna, Weinstock & Lightdate, 2011; LaVelle & McLaughlin, 2008).

LaVelle and McLaughlin (2008) examined simulation-based education and patient safety in the ambulatory care setting for over 12 months. Their sample (n = 454) consisted of self-reported feedback on simulation experiences; 53% stated that prior to participating in a simulation, they had been uncomfortable with their specific role in a patient emergency/crisis. After participating, 51% reported an increase in confidence about their specific role in a patient emergency/crisis, while 48% stated that they had gained some improvements. The study had an unexpected benefit, since it identified and addressed 40 safety concerns (LaVelle & McLaughlin, 2008).

As evidenced in the literature (e.g., Butlas, Hassler, Ercole, & Rea, 2014; Lindamood & Weinstock, 2011), a growing trend is the use of patient simulation to prepare healthcare professionals for high-stakes emergencies, such as those in critical care, neonatal, pediatrics, and labor and delivery settings. The use of patient simulation has also shown positive outcomes in preparing for emergency situations that occur too infrequently to provide adequate firsthand training (Heard et al., 2011; Kim, 2016). For example, hospital labor and delivery units may seldom encounter birthing emergencies, but when presented with such an emergency, healthcare professionals must make split-second decisions that can mean life or death for the mother and/or baby (Lindamood & Weinstock, 2011). Patient simulation provides a method for teaching and developing the skills that are important for achieving optimal patient outcomes (Heard et al., 2011; Lindamood & Weinstock, 2011).

Sollid et al. (2016) asserted that healthcare simulations contribute to patient safety by offering “technical and nontechnical skills training…and system probing” (p. 7). From a conceptual standpoint, this finding is congruent with a study conducted at a UK military hospital (Arora et al., 2014). In that study, a large-scale, simulation-based training session was conducted in multiple departments and across the entire patient stay. This study, which was the first of its kind, involved 288 participants and examined the consistency of skill assessments (Cronbach’s α: nontechnical skills = 0.87–0.94; environment/patient skills = 0.83–0.95). Pre- and post-comparisons of the simulated hospital experience (HOSPEX) showed significant improvements in decision making ($P = 0.03$), situational awareness ($P = 0.01$), trauma care ($P = 0.05$), and knowledge of the hospital environment ($P = 0.04$). The data was collected before and after three sequential simulations and once after deployment in a conflict zone. The findings indicated that the skills learned in simulation are transferable to real-life patient care. In the areas assessed, no regression or decline was found among participants in the conflict zone. The healthcare personnel in the study embraced this type of simulation training, which resulted in improvements in decision making and interactions. Arora et al. (2014) recommended that more research of this magnitude should be conducted but indicated that cost may be the largest barrier in healthcare settings.

Butlas et al. (2014) conducted a study using patient simulation among pediatric nurses. The authors compared patient simulation to static manikin use for improving skills in recognizing and intervening in a declining pediatric patient. They found no statistically significant differences between the groups (control = 14; experimental = 19), but they did note a marked improvement in team performance and confidence levels when the nurses were caring for a deteriorating patient. Previous studies have shown positive results (LaVelle & McLaughlin, 2008; Lindamood &Weinstock, 2011; Ulrich, 2013) regarding the use of patient simulation for healthcare staff development, such as increased confidence in emergencies, readiness to engage in emergencies, enhanced communication, and improved point-of-care performance, all of which have increased patient safety in the healthcare setting.

Safety Events

A risk manager must deal with many types of patient safety concerns (Paneasar et al., 2014). The American Society for Healthcare Risk Management (Hoppes & Mitchell, 2014) described three categories of events: serious safety events, safety events, and pre-patient events. A serious safety event describes incidents with a patient harm level of death, severe permanent harm, or temporary harm. A safety event produces moderate, mild, or no harm for the patient. A good catch has the power to cause harm but does not affect the patient. For each level of harm, the risk manager must complete a follow-up analysis, such as root cause, apparent cause, common cause, or barrier (Paneasar et al., 2014).

Slakey, Simms, Rennie, Garstka, and Korndoreffer (2014) studied the simulation of adverse outcomes after an RCA had been completed. They found that the factors that interfered with decision making were better evaluated with the use of simulation than without. In the first simulated case, the adverse event was duplicated in 33% (two of six) of the simulations and avoided in 66.7% (four of six). The second simulated case, using a different RCA, resulted in the same frequency of duplication and avoidance of the adverse event. In the third simulated case, 85.7% the participants did not replicate the adverse event.

Simulations of adverse events can offer a deeper understanding of the RCA and can identify additional areas of improvement that the RCA alone could not have uncovered (Slakey et al., 2014). Similarly, Davis (2016) conducted three simulations for each of the three types of sentinel event cases (a total of nine simulations). The sentinel event cases were based on reports from the hospital's Continuous Quality Improvement Office. Four common themes were visible across all three cases, including: 1) gaps in knowledge and preparedness for managing deteriorating patients, 2) team dynamics and decision making during deteriorating patient simulation, 3) crew communication, and 4) the impact of debriefing on gaining closure and understanding related to the sentinel events.

Estock et al. (2015) assessed the risk of medication labeling errors using simulation. Their study included a control group who worked with an existing label design for a high-risk medication and an experimental group who used a redesigned label for the same medication. The results showed that the participants selected the redesigned label a significantly greater number of times than they did the existing label: the results were 63% versus 37%, with an odds ratio of 2.61 (95% confidence interval [CI], 1.1–6.1) and $P = 0.03$.

Failure-to-rescue. Kuo et al. (2016) discussed FTR as a quality care measure for mortality rates within hospital settings. The FTR represents how medical personnel respond to the severity of patient illness. According to Kuo et al. (2016), if an FTR has occurred, then it is implied that death has occurred. Complications and death cannot be completely prevented, however. Many factors contribute to the outcome of FTR, such as patient co-morbidities and their state of health at the onset of complications. Kuo et al. (2016) conducted a review of trauma cases (N =

26,557); 2,735 of the patients experienced complications, and 359 of those patients died as a result of FTR. Of the cases that resulted in patient death, 75.6% were determined to have been unpreventable, 18.1% were possibly preventable, and 6.1% were considered preventable (Kuo et al., 2016). The authors concluded that it was important for the medical community to clearly examine what defines FTR when it is used as a measure of quality.

Just as simulation is a key component of securing public safety in aviation to ensure that pilots understand the protocols in the event of mid-air problems (Ruddy & Patterson, 2008; Seago, 2016), patient simulation should be used in healthcare practices to promote patient safety and to increase intra-professional collaboration for the prevention of sentinel events (Bonjour et al., 2016; Heard et al., 2011; Lavelle & McLaughlin, 2008). The studies discussed here demonstrate the untapped insights that simulation can provide regarding safety-event education and RCAs, thus promoting safer care in real patient environments. Connell et al. (2018) conducted a systematic review that examined the effectiveness of education in recognition and management of deteriorating patients. They examined 23 studies that were published between 2002-2014. The authors concluded that simulation was an effective method for training. They found that high to medium fidelity was superior to low-fidelity in meeting learner outcomes. In situ simulation had ongoing positive impact on the actual implementation of rapid response teams in real world situations.

Simulation provides a way for RNs and other healthcare professionals to experience and learn from real-world care events without causing any risk to real patients. With more practice, healthcare professionals can become more confident in their abilities to handle changes in their patients' conditions. Confidence in one's own abilities can also be described as self-efficacy (Artino, 2012; Welsh, 2014). Just as the literature has described the use of simulation to increase confidence in handling rare labor and delivery emergencies (Lindamood & Weinstock, 2011), the same can be applied to increasing confidence in identifying deteriorating patients in order to prevent FTR situations.

Theoretical Framework

Patient simulation creates an essential, experiential learning experience. Experiential learning, as described by Dewey (1997), consists of hands-on interactions within an environment that are done with real team members; the simulation is followed by reflection, which is achieved in patient simulation through a debriefing session. Instructional design is pivotal for developing patient simulation experiences that do not exceed the participants' cognitive capacities and make learning meaningful (Bong, Fraser, & Oriot, 2016; Smith & Ragan, 1999).

Bandura's (1993) self-efficacy theory helps to conceptualize the creation of meaning that occurs when simulation is used among licensed healthcare professionals, such as RNs (Peterson & Bredow, 2009). Perceived self-efficacy comes from the internal assessment of one's own performance and abilities (Peterson & Bredow, 2009). Bandura (2009) described how perceived self-efficacy affects personal educational and career decisions. People with higher levels of self-efficacy will likely pursue broader interests and have better endurance, even in challenging pursuits (Bandura, 2009). People with lower levels of self-efficacy tend to feel that the stressful, emotional, and physical demands of their educational and professional pursuits exceed their efficacy levels and coping abilities (Bandura, 2009).

Bandura (2009) described enactive attainment, which involves actual performance through repetition (Artino, 2012; Resnick, 2013), as the strongest influence on self-efficacy. The act of practicing to recognize a deteriorating patient through simulation may help increase nurses' self-efficacy in preventing failure to rescue situations in a safe environment.

O'Leary, Nash, and Lewis (2016) conducted a study that examined self-efficacy of critical care RNs when using simulation in training how to recognize deteriorating pediatric patients. There was a significant increase in self-efficacy in the simulation group (p= <0.01) compared to the control group without simulation (p= 0.92).

This theory supports the current study, in that risk management and nursing education can implement simulation to develop self-efficacy among individual staff members dealing with stressful situations, including the much-feared deteriorating patient who requires rescue.

Methods and Procedures

This study, which was completed in June 2018, used a quasi-experimental, one-group pretest-posttest design. The study examined if the use of patient simulation with a debriefing session would impact the perceived self-efficacy of RNs in their ability to recognize a deteriorating patient in order to prevent FTR events. The following subsections summarize the methods and procedures for this pilot study to fulfill the requirements for the Doctor of Nursing Practice Scholarly Project.

Ethical Considerations

Approval for this pilot study was granted by the university internal review board (IRB) and the nursing research committee at the study location. On the morning of data collection, the PI greeted the potential participants and informed them of the study, including the facts that participation was completely voluntary and that the survey information would be anonymous. The potential study participants were informed that their consent to participate in the study would be implied through their submission of the completed NCSES. Only a designated member of the hospital personnel has the sign-in sheet (with names randomly assigned numbers) in a locked drawer and office.

Participants and Setting

A convenience sample was obtained from a group of new graduate RNs attending their final day of new-hire hospital orientation. The sample included both day- and night-shift RNs, from a variety of nursing care units in an urban acute-care hospital. The 519-bed hospital is located in a metropolitan area and provides a variety of health services, from acute to palliative care.

Study participants (N = 18) were never identified by name; instead, they were assigned a unique random four-digit identifier. The primary investigator (PI) used a smartphone application that generated a list of random numbers and then wrote a four-digit number on each survey. As participants signed in for the morning orientation, the initial survey was randomly distributed to each participant; the random four-digit number on each survey then followed them throughout the study. The initial survey asked for demographic data, including age range, years of nursing experience, education level, gender, and position (full-time or part-time). One participant left the orientation program after completing the pretest but before the simulation and was eliminated from the study.

In the afternoon, the PI delivered a 40-minute presentation on the topic of clinical reasoning and caring for deteriorating patients. The presentation material, which had been developed previously by the hospital nursing education department, used case examples to cover clinical reasoning skills and assessing a deteriorating patient. The additional content developed by the PI included descriptions of patient safety, medical errors, sentinel events, and FTR situations. The PI discussed the importance of having clinical reasoning skills, promoting patient safety, understanding sentinel events, and recognizing early that a patient requires rescue.

Intervention

After the presentation, the study participants were divided into two groups (n = 9; n = 8) to rotate through a 15-minute deteriorating patient simulation. In the first group, five participants were observed while four participants served the RN role for the simulated patient, immediately followed by a 15-minute debriefing. In the second group, four participants were observed while four participants served the RN role for the simulated patient, also immediately followed by a 15-minute debriefing. The deteriorating patient scenario was of a 70-year-old male admitted to a medical-surgical unit for abdominal pain, to rule-out pancreatitis. This simulated patient had a significant heart history and a normal saline intravenous infusion at 150 ml/hr. During the morning shift assessment, the patient complained of fatigue, was now on oxygen, and had experienced a 10-pound weight gain in two days. Once the participants identified that this was a concern, or they used resources (such as a charge nurse or rapid response team), the simulation concluded.

Evaluation

Instruments

Data on perceived self-efficacy was collected, with permission, using the Nursing Care Self-Efficacy Scale (NCSES) developed by Welsh (2014). The NCSES is a 16-item questionnaire in which participants are asked to rate on a Likert scale how confident they are in performing each of the described tasks. The scale ranges from 0 to 10, with 0 meaning “I cannot do [the task] at all,” 5 meaning “I am moderately certain I can do [the task],” and 10 meaning “I am certain I can do [the task].” Welsh (2014) distinguishes the two sections of the questionnaire as “complex” and “fundamental” nursing care, based on tasks that require different skill sets and resources, as opposed to the importance of care. Welsh (2014) reported the reliability of this tool to be adequate, with a Cronbach's α of 0.87 to 0.94. When looking at validity, a factor analysis demonstrated the complex nursing care component explained 54% of the instrument variance, while 7.8% of variance was explained by fundamental nursing care when constructing the scale.

Data Collection and Analysis

The pretest, using the NCSES, was completed using pen and paper, which was distributed to participants ($N = 18$) immediately before the orientation program started and then collected. The posttest, also using the NCSES, was distributed immediately after the debriefing of the simulation for each group ($n = 9$; $n = 8$) and collected. The collected data was analyzed using a nonparametric Wilcoxon signed ranks test via SPSS software. This statistical analysis, which was best suited for the small sample size with a pretest-posttest measure used in this study, is discussed further in the results section.

Results

The following is a discussion of the descriptive statistics and findings of this study. The convenience sample included 17 participants who consented by completing the pretest and posttest.

Demographic Data

The participants were new graduate RNs attending a mandatory hospital orientation. All participants ($n = 17$) had less than one year of nursing experience; 11 had not started on the unit with their preceptor, while six had started on the unit with their preceptor, with four being hired in April and the rest in June.

Age, gender, ethnicity, and highest degree. The majority (76.5%) of the participants were 18–24 years of age, with 23.6% being 25–50 years of age. The participants were predominantly female (88.2% vs. 11.8% males). The ethnicity was dominantly Caucasian (82.4%), while 17.7%

were African-American, Latino, or other. The majority (76.5%) of the participants had a bachelor's degree, and 23.5% had an associate degree.

Limited demographic data was provided in most of the literature that was reviewed. Most of the literature identifies scope of practice and specialty, such as physicians, RNs, and paramedics, as well as pediatric unit, critical care, or emergency room (Arora et al., 2014; Butlas et al., 2014; Heard et al., 2011). One specific study conducted by Beyea, Slattery, and von Reyn (2010) that assessed the outcome of simulation in a nurse residency program had similar demographics, despite that study's larger sample size. Most of the participants in the present study were female, had a bachelor's degree, and were younger than 30 years old. Table 1.0 shows the frequencies of age, ethnicity, gender, and highest degree among the participants.

Table 1.0
Demographic Frequencies (n = 17)

		Frequency	Percentage
Age	18–24	13	76.5
	25–30	2	11.8
	41–50	2	11.8
Gender	Female	15	88.2
	Male	2	11.8
Ethnicity	Other	1	5.9
	Latino	1	5.9
	Caucasian	14	82.4
	African-American	1	5.9
Highest Degree	**ADN**	**4**	**23.5**
	BSN	**13**	**76.5**

Unit assigned and ACLS-certified. The type of units assigned varied little among the participants. Less than one-third (29.4%) of the participants identified as "other," which included post-anesthesia care unit, operating room, mother-baby/labor delivery, or ancillary department (e.g., radiology); other participants were certified in the telemetry unit (29.5%), medical-surgical unit (17.6%), or critical care and emergency room (both 11.8%). Only 17.6% of the participants were ACLS-certified. Table 1.1 shows the frequencies of unit assigned and ACLS certification among the participants.

Table 1.1
Demographic Frequencies (n = 17)

		Frequency	Percentage
Unit Assigned	Other	5	29.4
	Telemetry	5	29.4
	Critical care	2	11.8
	Medical-surgical	3	17.6
	Emergency department	2	11.8
ACLS Certified?	Yes	**3**	**17.6**
	No	**14**	**82.4**

Intervention Data

The study participants completed the NCSES prior to the start of the presentation, which was on the topic of clinical reasoning and caring for deteriorating patients. The data collected was analyzed using a nonparametric Wilcoxon signed ranks test via SPSS software. The confidence level was set at 0.05 for this analysis. The mean NCSES scores shown in Table 1.2 increased on all 16 of the posttest items except item #11, in which no change occurred from pretest to posttest.

Table 1.2
Pre-Post Means (n = 17)

NCSES Item	Pre Mean	SD	Post Mean	SD
Complex Nursing Care				
1. Promotes patient control over decision making with hospital care.	7.41	1.66	8.00	1.27
2. Delivers care that addresses cultural differences.	7.65	1.27	7.94	1.25
3. Teaches patients about self-care for optimal health.	7.82	1.70	8.47	1.18
4. Uses research findings in practice.	7.76	2.02	8.41	1.18
5. Manages interpersonal conflict in the workplace.	7.06	2.21	7.53	1.94
6. Uses resources effectively to meet patient care demands.	8.00	1.37	8.53	1.28
7. Guides team members when situations rapidly change.	5.65	1.90	7.24	1.15
8. Provides emotional support for hospitalized patients.	8.29	1.86	8.65	1.46
9. Delegates patient care tasks appropriately.	7.59	1.66	8.06	1.30
10. Collaborates effectively with the interprofessional team.	7.35	2.03	8.06	1.09
11. Intervenes to minimize patient pain and suffering.	*8.35*	*1.32*	*8.35*	*1.32*
Fundamental Nursing Care				
12. Safely performs the technical skills required for patient care.	8.12	1.87	8.47	1.33
13. Prioritizes interventions to address changing patient needs.	7.53	1.42	8.35	1.46
14. Implements interventions to effectively treat patient problems.	7.71	1.36	8.41	1.37
15. Interprets patient data from a variety of sources.	7.35	1.32	8.41	1.33
16. Evaluates patient response to care.	8.18	1.38	8.59	1.37

Notes: The actual questions begin with “Promote,” “Deliver,” etc., since the lead-off statement is “My degree of confidence to be able to…” The *italics* in item 11 indicate no pre/post change.

Table 1.3 shows that the Wilcoxon signed rank test revealed a statistically significant increase in self-efficacy with the use of simulation after the presentation of clinical reasoning and caring for deteriorating patients on four of the 16 items of the NCSES. Among the subscale, “complex nursing care” item seven was significantly different (z = -2.528; p < 0.05), while three items on the “fundamental nursing care” subscale were significantly different, including item 13 (z = -2.801; p < 0.05), item 14 (z = -2.080; p < 0.05), and item 15 (z = -3.218; p < 0.05).

Table 1.3
Wilcoxon Signed Ranks Test (Post- and Pre-)

NCSES Item	Z	Asymp. Sig. (2-tailed)
Complex Nursing Care		
1. Promotes patient control over decision making with hospital care.	-1.556	0.120
2. Delivers care that addresses cultural differences.	-1.890	0.059
3. Teaches patients about self-care for optimal health.	-1.895	0.058
4. Uses research findings in practice.	-1.485	0.138
5. Manages interpersonal conflict in the workplace.	-1.483	0.138
6. Uses resources effectively to meet patient care demands.	-1.427	0.154
7. Guides team members when situations rapidly change.	*-2.528*	*0.011*
8. Provides emotional support for hospitalized patients.	-1.294	0.196
9. Delegates patient care tasks appropriately.	-1.078	0.281
10. Collaborates effectively with the interprofessional team.	-1.809	0.070
11. Intervenes to minimize patient pain and suffering.	-0.054	0.957
Fundamental Nursing Care		
12. Safely performs the technical skills required for patient care.	-0.984	0.325
13. Prioritizes interventions to address changing patient needs.	*-2.801*	*0.005*
14. Implements interventions to effectively treat patient problems.	*-2.080*	*0.038*
15. Interprets patient data from a variety of sources.	*-3.218*	*0.001*
16. Evaluates patient response to care.	-1.469	0.142

Note: numbers in *italics* (7, 13, 14, 16) showed significant differences.

As discussed earlier, six participants were already on the floor precepting with their RN preceptors, and 11 were not yet on the floor. The Wilcoxon signed ranked test was run on these participants separately. The six who had started on their assigned units with their preceptors showed no statistical significance on any of the 16 items. None of these six participants were ACLS-certified. In contrast, the 11 participants who had not started on their assigned units with their preceptors (three of whom were ACLS-certified) had statistically significant posttest and pretest differences on five NCSES items. Three of these were statistically significant for the whole sample (n = 17). On the “complex nursing care” subscale, items two (z = -2.000; p < 0.05), five (z = -2.264; p < 0.05), and seven (z = -2.714; p < 0.05) were statistically different from pre- to posttest. The “fundamental nursing care” subscale items 13 (z = -2.714; p < 0.05) and 15 (z = -2.739; $p < 0.05$) were statistically different from pre to posttest. Table 1.4 shows that the Cronbach's α ranged from 0.94 to 0.97 among the entire NCSES and subscales, indicating internal consistency.

Table 1.4
Instrument Reliability

	Number of Items	Item *M*	SD	Alpha
Complex nursing care	11	8.112	11.723	0.944
Fundamental nursing care	5	8.447	6.427	0.965
Total NCSES	**16**	**8.217**	**17.660**	**0.968**

Discussion and Recommendations

This project examined the effect of patient simulation with debriefing by assessing perceived self-efficacy before and after the intervention as an anticipatory education method for reducing the risk of FTR situations. The results demonstrated that self-efficacy significantly increased on four of the 16 items. The mean increased on 15 of 16 items; one item had no change in mean from pretest to posttest.

The statistical significance ($p < 0.05$) on the four items of the NCSES means that the participants felt that they were more confident (i.e., had more self-efficacy) after the simulation in providing nursing care in the following ways:

- Item 7: *Guides team members when situations rapidly change*. An important step in preventing FTR situations is for the RN to call the rapid response team or inform the unit charge nurse of a change in a patient's condition as early as possible.
- Item 13: *Prioritizes interventions to address changing patient needs.* To determine priorities, RNs must correctly assess what needs to be addressed first; assessment is a critical competent in identifying the early signs of a deteriorating patient.

- Item 14: *Implements interventions to effectively treat patient problems.* An example of this would be implementing proper unit protocols (e.g., hypoglycemia or supplemental oxygen).
- Item 15 *Interprets patient data from a variety of sources.* The RN must use clinical reasoning skills to identify changes by looking at trends in vitals, behavior, neurological status, and lab results. Waiting until significant vital sign changes occur places patients in a greater compromised state of hemostasis.

For this study, as these results show, simulation appears to have increased self-efficacy overall among the RN participants.

Sustainability

Though many strengths exist for the hospital, the Magnet status is of importance, as it sets higher standards for providing safe evidence-based nursing care. Patient simulation can cultivate several opportunities, such as reducing FTR situations and sentinel events, honing clinical reasoning skills, and improving patient outcomes. There are some weaknesses, the most notable of which is the small size of the existing simulation lab and the limited resources available for simulation. These and other weaknesses pose threats to patient outcomes, simulation buy-in, and the promotion of optimal critical reasoning skills.

The goals of this project may be continued by the facility using already-existing resources and orientation programs for new graduate RNs. Long-term sustainability could prove difficult, however, owing to environmental, economic, and social constraints. The social aspects include getting hospital staff and administration to buy in to the concept of patient simulation as a viable experiential learning method in the hospital setting so that resources can be allocated for program sustainability. To sustain the environment, simulation resources and technology must be encouraged and grown, which in turn will have an economic impact on organizational budgets.

Limitations

In addition to the limitations described in the above sustainability discussion, the primary limitations of this study include the following.

1. The sample size (n=17) was small, although a nonparametric Wilcoxon signed ranks test was used to analyze the data; this form of testing was the most appropriate due to the small sample size and ordinal measures used in the study.
2. The study participants were identified using convenience sampling. The only group available at the study site was the new graduate RN orientation group. An existing orientation program discussed clinical reasoning and deteriorating patients without simulation.

Future Recommendations

Several recommendations for continuing research can be made based on the results of this study. Future recommendations for continued research include the following:

1. replicate the study with a larger sample size and with experienced RNs over a longer period of time;
2. investigate personal self-efficacy, since this relates to the level of people's achievement in their ability to practice at bedside or to achieve individual practice goals;
3. investigate self-efficacy among a control group using a presentation with case study group and presentation with simulation a group;

4. expand the patient simulation to include multidisciplinary participants to help develop communication and leadership in proving responsibility for patient care.

Conclusion

This evidence-based practice project has implemented simulation as an educational strategy in a new graduate orientation program as an anticipatory method for reducing the risk of FTR events through improving self-efficacy. The findings of this pilot study suggest that perceived self-efficacy did improve after a simulation focused on FTR. The literature supports that increased self-efficacy may improve patient outcomes through increasing the likelihood that the nurse will recognize and act upon early signs of FTR situations (Arora et al., 2014). Patient simulation is an effective tool in educating nurses and improving their confidence in caring for patients who are deteriorating. There is great promise for future research in this area, with the goal of promoting optimal patient and population health outcomes.

References

Aebersold, M. (2011). Using simulation to improve the use of evidence-based practice guidelines. *Western Journal of Nursing Research*, *33*, 296-305.

Aggarwal, R., & Darzi, A. (2011). Simulation to enhance patient safety: Why aren't we there yet? *Chest*, *4*, 854-858.

Andel, C., Davidow, S. L., Hollander, M., & Moreno, D. A. (2012). The economics of health care quality and medical errors. *Journal of Health Care Finance*, *39*, 39-50.

Arora, S., Cox, C., Davies, S., Kassab, E., Mahoney, P., Sharma, E., . . . Sevdalis, N. (2014). Towards the next frontier for simulation-based training full-hospital simulation across the entire patient pathway. *Annals of Surgery*, *260*, 252-258.

Artino, A. R. (2012). Academic self-efficacy: From educational theory to instructional practice. *Perspectives on Medical Education*, *1*, 76-85.

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist*, *28*, 117-148. Retrieved from https://www.uky.edu/~eushe2/Bandura/Bandura1993EP.pdf

Bandura, A. (2009). *Handbook of principles of organization behavior* (2nd ed.). New York, NY: Wiley.

Beyea, S. C., Slattery, M. J., & Reyn, L. J. (2010). Outcomes of a simulation-based nurse residency program. *Clinical Simulation in Nursing*,*6*(5), e169-e175. doi:10.1016/j.ecns.2010.01.005

Bong, C. L., Fraser, K., and Oriot, D. (2016). Cognitive load and stress in simulation. In V. J. Grant & A. Cheng (Eds.), *Comprehensive healthcare simulation: Pediatrics* (pp. 3-18). Cham, Switzerland: Springer.

Bonjour, T. J., Charny, G., & Thaxton, R. E. (2016). Trauma resuscitation evaluation times and correlating human patient simulation training differences—What is the standard? *Military Medicine*, *181*, e1630-e1636. https://doi.org/10.7205/MILMED-D-14-00486

Butlas, M. W., Hassler, M., Ercole, P. M., & Rea, G. (2014). Effectiveness of high-fidelity simulation for pediatric staff nurse education. *Pediatric Nursing*, *40*, 27-42.

Carroll, R. L. (2015). Where we've been, where we are, and where are we going: A 35-year perspective on healthcare risk management. *American Society for Healthcare Risk Management*, 35, 9-20.

Connell, C. J., Endacott, R., Jackman, J. A., Kiprillis, N. R., Sparkes, L. M., & Cooper, S. J. (2018). The effectiveness of education in recognition and management of deteriorating patients: A systematic review. *Nursing Education Today*, *44*, 133-145.

Davis, J. E. (2016). *The use of simulation in causal analysis of sentinel events in healthcare* (doctoral dissertation). Retrieved from http://repository.upenn.edu/dissertations/AAI10245907/

Dewey, J. (1997). *How we think*. Mineola, NY: Dover.

Dumitrescu, A., & Ryan, A. (2014). Addressing the taboo of medical error through IGOs: I got burnt once. *European Journal of Pediatrics*, *173*, 503-508.

Estock, J. L., Murray, A. W., Mizah, M. T., Mangione, M. P., Goode, J. S., & Eibling, D. E. (2015). Label design affects medication safety in an operating room crisis: A controlled simulation study. *Journal of Patient Safety*, *00*, 1-6.

Hallenbeck, V. J. (2012). Use of high-fidelity simulation for staff education/development. *Journal for Nurses in Staff Development*, *28*, 260-269.

Heard, L. A., Fredette, M. E., Atmadjua, M. L., Weinstock, P., & Lightdale, J. R. (2011). Perceptions of simulation-based training in crisis resource management in the endoscopy unit. *Society of Gastroenterology Nurses and Associates, 34*, 42-48.

Hoppes, M., & Mitchell, J. (2014). *Serious safety events: A focus on harm classification: Deviation in care as link.* “Getting to zero” white paper series. Retrieved from American Society for Healthcare Risk Management: http://www.ashrm.org/pubs/white_papers.dhtml

Institute of Medicine (IOM). (1999). *To err is human: Building a safer health system*. Retrieved from https://www.nap.edu/catalog/9728

Joint Commission. (2017). *Sentinel event*. Retrieved from https://www.jointcommission.org/sentinel_event_policy_and_procedures/

Kim, K. O. (2016). A first step toward understanding patient safety. *Korean Journal of Anesthesiology, 69*, 429-434.

Kinnan, J. P. (2006). *Sentinel events*. Retrieved from https://www.the-hospitalist.org/hospitalist/article/123211/sentinel-events

Kohn, L. T., Corrigan, J., & Donaldson, M. S. (2000). *To err is human: Building a safer health system*. Washington, DC: National Academy Press.

Kuo, L. E., Kaufman, E., Hoffman, R. L., Pascual, J. L., Martin, N. D., Kelz, R. R., & Holena, D. N. (2017). Failure-to-rescue after injury is associated with preventability: The results of mortality panel review of failure-to-rescue cases in trauma. *Surgery*, *161*(3), 782-790. https://doi.org/10.1016/j.surg.2016.08.017

Kusler-Jensen, J. A. (2014). Cardiac emergency simulation: Drilling for success in the ambulatory setting. *Journal of Association of periOperative Registered Nurses*, *99*, 385-394.

LaVelle, B. A., & McLaughlin, J. J. (2008). Simulation-based education improves safety in ambulatory setting. *Advances in Patient Safety: New Directions and Alternative Approaches*, *3*(special issue). Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK43667/

Leigh, G. (2011). The simulation revolution. *Journal for Nurses in Staff Development*, *27*, 54-57.

Leighton, K. (2013). Simulation in nursing. In A. I. Levine, S. DeMaria, A. D. Schwartz, & A. J. Sim (Eds.), *The comprehensive textbook of healthcare simulation* (pp. 425-460). New York, NY: Springer.

Lindamood, K. E., & Weinstock, P. (2011). Application of high-fidelity simulation training to the neonatal resuscitation and pediatric advanced life support programs. *Newborn & Infant Nursing Reviews*, 11, 23-27. https://doi.org/10.1053/j.nainr.2010.12.010

Miller, G. (2013). The best health care system in the world? *Social Work*, *58*, 181-183.

O'Leary, J., Nash, R., & Lewis, P. (2016). Standard instruction versus simulation: Educating registered nurses in the early recognition of patient deterioration in paediatric critical care. *Nurse Education Today*, *36*, 287-292.

Paneasar, S., Carson-Stevens, A., Salvilla, S., & Sheikh, A. (2014). *Patient safety and healthcare improvement at a glance*. Retrieved from http://www.bellarmine.edu/library/

Peterson, S. J., & Bredow, T. S. (2009). *Middle range theories application to nursing research* (2nd ed.). Philadelphia, PA: Wolters Kluwer / Lippincott Williams & Wilkins.

Phrampus, P.E. & O'Donnell, J.M. (2013). Debriefing using a structured and supported approach. In A. I. Levine, S. DeMaria, A. D. Schwartz, & A. J. Sim (Eds.), *The comprehensive textbook of healthcare simulation* (pp. 425-460). New York, NY: Springer.

Reece, S., Cooke, C., Polivka, B., & Clark, P. (2016). Relationship between mock code results on medical-surgical units, unit variables, and RN responder variables. *MEDSURG Nursing*, *25*(September/October), 335-340.

Resnick, B. (2013). Self-Efficacy. In S. J. Peterson & T. S. Bredow (Eds.), *Middle range theories application to nursing research* (3rd ed., pp. 82-93). Philadelphia, PA: Wolters Kluwer / Lippincott Williams & Wilkins.

Rosen, K. (2013). History of simulation. In A. I. Levine, S. DeMaria, A. D. Schwartz, & A. J. Sim (Eds.), *The comprehensive textbook of healthcare simulation* (pp. 5-49). New York, NY: Springer.

Ruddy, R. M., & Patterson, M. D. (2008). Medical simulation: A tool for recognition of and response to risk. *Pediatric Radiology*, *38*, S700-S706.

Rutherford-Hemming, T., & Alfes, C. M. (2017). The use of hospital-based simulation in nursing education: A systematic review. *Clinical Simulation in Nursing*, *13*, 78-89.

Seago, T. K. (2016). *A debriefing technique in high-fidelity patient simulation and competent decision-making abilities among nursing students* (doctoral dissertation). Retrieved from https://doi.org/10.13023/ETD.2016.473

Slakey, D. P., Simms, E. R., Rennie, K. V., Garstka, M. E., & Korndoreffer, J. R. (2014). Using simulation to improve root cause analysis of adverse surgical outcomes. *International Journal for Quality in Health Care*, *26*, 144-150.

Smith, P. L., & Ragan, T. J. (1999). *Instructional design* (2nd ed.). New York, NY: Wiley.

Sollid, S., Dieckman, P., Aase, K., Soreide, E., Ringsted, C., & Ostergarrd, D. (2016). Five topics health care simulation can address to improve patient safety: Results from a consensus process. *Journal of Patient Safety*, *00*, 1-10. doi: 10.1097/PTS.0000000000000254

Ulrich, B. (2013). Leading an organization to improved outcomes through simulation. *Nurse Leader*, *11*, 42-45.

Vincent, C. (2001). *Clinical risk management: Enhancing patient safety* (2nd ed.). London: BMJ Books. Retrieved from http://www.bellarmine.edu/library/

Welsh, D. (2014). Self-efficacy measurement and enhancement strategies for medical-surgical clinical nurses. *MEDSURG Nursing*, *23*(November/December), 371-377.

Wheeler, D. W., Williams, C. E., & Merry, A. F. (2009). Pulling the plug on ad hoc critical incident reporting. *British Journal of Anaesthesia*, *103*(2), 145-147. https://doi.org/10.1093/bja/aep193